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EXAMINER

BAREFORD, KATHERINE A

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 08/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/779,827

Applicant(s)

HONGO ET AL.

Examiner

Katherine A. Bareford

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/24/06.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 1-3 are canceled

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. The amendment of July 24, 2006 has been received and entered.

With the amendment, claims 1-3 have been canceled and new claims 4-13 have been provided for examination.

Drawings

2. The replacement drawing of Figure 11 was received on July 24, 2006. This drawing is approved.

Because of this replacement drawing providing the legend "Prior Art", the objection to Figure 11 is withdrawn.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. ⁶⁻⁸~~5-7~~ Claims are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

New claim 6 provides heating the substrate before immersion. New claim 7 provides heating the substrate to a temperature equal to the temperature of the electroless plating treatment liquid. New claim 8 provides flowing the electroless plating treatment liquid in the plating chamber at a flow rate of 1 to 30 l/min. These claims all depend ultimately from claim 4. The disclosure as originally filed provides in the specification an embodiment (the "first embodiment") where such heating and such a flow rate occurs. However, this first embodiment is not the embodiment of claim 4, but rather the embodiment of claim 9. In the specification where the embodiment as to providing an inclined surface to be immersed is described ("the second embodiment") there is no description of such a heating or flow rate or any suggestion that such heating or flow rate can be used. For example, the holding structure for the substrate is not provided with heating and the flow rate over a "quadratic curved surface" is not provided. As a result, these claims contain new matter.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 9-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9, lines 5-6, it is unclear how "flowing an electroless plating treatment liquid as a laminar flow along a quadratic curved surface of a plating chamber" will provide the removal of the gas, as there is no requirement in the claim to contact the surface with this liquid while it is flowing as described. Furthermore, it is unclear what is meant by "quadratic curved surface". As worded how must the surface be "quadratic"?

The other dependent claims do not cure the defects of the claims from which they depend.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 4-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathieu (US 6685817) in view of Zhao et al (US 5660706).

Mathieu teaches a plating method for the microelectronic industry, and indicates that electroless and electroplating can be used for plating in the industry. Column 1, lines 10-30. Mathieu provides positioning the substrate to plated facing downwardly. Figure 4 and column 6, lines 50-65. The surface to be plated is immersed in the plating bath in a plating chamber and then processed by the plating treatment liquid in the plating chamber. Column 8, lines 20-35.

Claim 5: the treatment liquid is heated on a bottom of the plating chamber. Column 8, lines 60-68 (since all of the plating solution in the tank is heated, the bottom would be heated as well).

Claim 6: the substrate can be heated. Column 3, lines 60-68.

Claim 8: the treatment liquid can be flowed in the plating chamber at a flow rate of 3 l/min. Column 8, lines 50-55.

Mathieu teaches all the features of these claims except the immersing the surface in an electroless bath an inclined state to remove gas.

However, Zhao teaches to apply an electric field while electrolessly depositing a metal as this electric field will act to initiate plating which replaces other activation techniques. Column 2, lines 40-60. Zhao teaches that when applying the electric field it

is beneficial for the wafer to be tilted and rotated so that the negative charges are moving continuously along the surface and not collected into isolated pockets. Column 8, lines 35-55.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Mathieu to use an electric field to initiate the electroless plating while the substrate is inclined as suggested by Zhao in order to more efficiently coat, as Mathieu teaches a plating process and Zhao teaches that when providing electroless plating it is desirable to provide an electric field and incline the substrate so as to save having to do other activation techniques. In performing this process, the substrate would be suggested to be inclined to the horizontal at the point of immersion and onward, because it is suggested to be inclined while plating, and efficient plating would be desired to start from the point of immersion. As the substrate would have the claimed inclination, the process would also inherently remove gas generated on the surface to be plated.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mathieu in view of Zhao as applied to claims 4-6 and 8 above, and further in view of France 2046679 (hereinafter '679).

Mathieu in view of Zhao teach all the features of this claim except the substrate temperature being the same as the bath temperature.

However, '679 teaches that it is well known to preheat a substrate to the same temperature as the plating bath when performing electroless plating. See the abstract (substrate preheated to 95 degrees C, electroless plating at 95 degrees C).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Mathieu in view of Zhao to preheat the substrate to the same temperature as the plating bath as suggested by '679 in order to provide a desirable plating, as Mathieu in view of Zhao teaches an electroless plating process and '679 teaches the well known desire to preheat the substrate to the same temperature as the bath when electroless plating.

11. Claims 9-11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathieu (US 6685817) in view of Chen et al (US 6565729).

Mathieu teaches a plating method for the microelectronic industry, and indicates that electroless and electroplating can be used for plating in the industry. Column 1, lines 10-30. Mathieu provides positioning the substrate to plated facing downwardly. Figure 4 and column 6, lines 50-65. The surface to be plated is immersed in the plating bath in a plating chamber and then processed by the plating treatment liquid in the plating chamber. Column 8, lines 20-35. Plating liquid is flowed upwardly against the surface to be plated, which would inherently remove gas generated on the surface to be plated. Figure 4 and column 8, lines 30-55.

Claim 10: the treatment liquid is heated on a bottom of the plating chamber.

Column 8, lines 60-68 (since all of the plating solution in the tank is heated, the bottom would be heated as well).

Claim 11: the substrate can be heated. Column 3, lines 60-68.

Claim 13: the treatment liquid can be flowed in the plating chamber at a flow rate of 3 l/min. Column 8, lines 50-55.

Mathieu teaches all the features of these claims except the flowing of the plating liquid along a quadratic curved surface in a laminar flow.

However, Chen teaches a plating bath system to coat a downwards facing surface. Figures 8-9 and column 16, line 60 through column 17, line 20. The coating can be by electroless plating. Column 16, line 60 through column 17, line 2. Plating liquid is flowed upwardly towards the surface to be plated. Figure 9 and column 17, lines 45-65 and column 18, line 60 through column 19, line 10. During the upward flow the liquid is flowed against a curved surface that appears to correspond to the "quadratic curved surface" of applicant. Figure 9 and column 18, line 60 through column 19, line 30 (see wall 560). This flow helps remove gas in the coating liquid. Figure 9 and column 18, line 60 through column 19, line 30.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Mathieu to flow the liquid using an injector system that includes a quadratic curved surface as suggested by Chen in order to help desirably remove gas, as Mathieu teaches a plating process for plating a downwards facing

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substrate and Chen teaches that when providing plating of a downwards facing substrate with an upward flow of plating liquid it is desirable to have the liquid flow over a quadratic curved surface as part of the supply process for the liquid. In performing this process, the liquid flow would desirably be laminar, as Chen specific desires to remove gas bubbles from the liquid, which would be reprovided by a turbulent flow.

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mathieu in view of Chen as applied to claims 9-11 and 13 above, and further in view of France 2046679 (hereinafter '679).

Mathieu in view of Chen teach all the features of this claim except the substrate temperature being the same as the bath temperature.

However, '679 teaches that it is well known to preheat a substrate to the same temperature as the plating bath when performing electroless plating. See the abstract (substrate preheated to 95 degrees C, electroless plating at 95 degrees C).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Mathieu in view of Chen to preheat the substrate to the same temperature as the plating bath as suggested by '679 in order to provide a desirable plating, as Mathieu in view of Chen teaches an electroless plating process and '679 teaches the well known desire to preheat the substrate to the same temperature as the bath when electroless plating.

13. Japan 10-135631 also teaches coating an inclined substrate. See the abstract.

Response to Arguments

14. Applicant's arguments filed July 24, 2006 have been fully considered but they are not persuasive.

(A) as to applicant's arguments as to claim 4, this claim corresponds to claim 2 are originally filed. Applicant argues that Mathieu does not provide the inclination of the substrate and Zhao does not provide any suggestion of immersing the substrate in the solution at the desired angle, merely disclosing that the substrate is inclined while in the container. Applicant notes that apparatus 20b of Zhao is a shower. Applicant further notes that the purpose of the tilting in Zhao is for causing movement of charges of opposite polarity and not to removing gas from the surface to be plated.

The Examiner has reviewed these arguments, however, the rejection is maintained. As to the suggestion of actually providing the immersion while the substrate is tilted, the Examiner notes first that Zhao provides a state where Zhao is immersed while tilted, as shown by Figure 1 and column 5, lines 45-60 (solution 21). As to the immersing of the substrate in the liquid as the article is inclined, it is the Examiner's position that, the substrate would be suggested to be inclined to the horizontal at the point of immersion and onward, because it is suggested to be inclined while plating, and efficient plating would be desired to start from the point of

immersion. As the substrate would have the claimed inclination, the process would also inherently remove gas generated on the surface to be plated. While Zhao provides the different benefit of movement of charges of opposite polarity, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

(B) Applicant's arguments with respect to claims 9-13 have been considered but are moot in view of the new ground(s) of rejection. The Examiner has provided the new reference to Chen as to the flowing on the quadratic surface as is newly claimed.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and

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any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KATHERINE BAREFORD
PRIMARY EXAMINER